

**WHAT IS CLAIMED IS:**

1. A method of optimizing and processing a query in a database management system in order to retrieve data from computer storage, the method comprising:  
receiving a query;  
preparing a first execution plan for the query;  
calculating a cost for the first execution plan, wherein the cost is represented as a first vector quantity comprising at least two dimensions; and  
determining whether the first execution plan should be selected for execution based on the first vector quantity.
2. The method of claim 1, further comprising providing a signal bearing medium which, when executed, performs the receiving, preparing and calculating.
3. The method of claim 1, wherein determining whether the first execution plan should be selected for execution comprises comparing two or more of the at least two dimensions.
4. The method of claim 1, wherein the at least two dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.
5. The method of claim 3, wherein the magnitude is a value having a highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude.
6. The method of claim 1, wherein calculating the cost comprises utilizing at least a second vector quantity comprising at least two dimensions.
7. The method of claim 5, wherein the at least two dimensions of the first vector quantity and the second vector quantity comprise at least one of a magnitude, a

variance range, a confidence and a penalty.

8. The method of claim 1, wherein if the first execution plan is not selected for execution, further comprising:
  - preparing a second execution plan;
  - calculating a cost for the second execution plan; wherein the cost for the second execution plan is represented as a second vector quantity comprising at least two dimensions; and
  - selecting one of the execution plans based on the first and second vector quantities.
9. The method of claim 7, further comprising determining whether a selected execution plan meets acceptance criteria based on the vector quantity of the selected execution plan, wherein if the selected execution plan meets the acceptance criteria the selected execution plan is executed.
10. The method of claim 7, wherein one of the at least two dimensions comprises a confidence value and further comprising determining whether a higher confidence value is desired for a selected plan and, if so, pursuing a strategy to increase the confidence value.
11. The method of claim 7, wherein the at least two dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.
12. The method of claim 10, wherein the magnitude is a value having the highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude
13. A method of optimizing and processing a query in a database management system in order to retrieve data from computer storage, the method comprising:

receiving a query;

calculating a first vector quantity of X dimensions, wherein X is an integer greater than 1;

calculating a second vector quantity of Y dimensions, wherein Y is an integer greater than 1; wherein the first and second vector quantities are to be used in calculating a cost for a first execution plan.

14. The method of claim 12, wherein at least one of the first vector quantity and the second vector quantity is selectivity.

15. The method of claim 12, further comprising:

calculating the cost for the first execution plan using the first vector quantity and the second vector quantity; wherein the cost is represented as a third vector quantity comprising N dimensions, wherein N is an integer greater than 1; and

determining whether the first execution plan should be selected for execution based on the third vector quantity.

16. The method of claim 14, wherein determining whether the first execution plan should be selected for execution comprises comparing each of the other N dimensions.

17. The method of claim 14, wherein the X dimensions, Y dimensions and N dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.

18. The method of claim 16, wherein the magnitude is a value having a highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude.

19. The method of claim 14, wherein if the first execution plan is not selected for

execution, further comprising:

preparing a second execution plan;

calculating a cost for the second execution plan; wherein the second execution plan is represented as a fourth vector quantity comprising M dimensions, wherein M is an integer greater than 1; and

selecting one of the execution plans based on the third and fourth vector quantities.

20. The method of claim 18, wherein the X dimensions, Y dimensions, N dimensions and M dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.

21. The method of claim 19, wherein the magnitude is a value having a highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude.

22. A method of optimizing and processing a query in a database management system in order to retrieve data from computer storage, the method comprising:  
receiving a query;  
preparing a first execution plan for the query;  
calculating a cost for the first execution plan, wherein the cost is represented as a first vector quantity comprising at least two dimensions, wherein at least one dimension is selected from a magnitude, a variance range, a confidence and a penalty; wherein the magnitude is a value having the highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude; and  
determining whether the first execution plan should be selected for execution based on the first vector quantity.

23. The method of claim 21, wherein determining whether the first execution plan should be selected for execution comprises comparing at least two of the at least two dimensions.

24. The method of claim 21, wherein if the first execution plan is not selected for execution, further comprising:

preparing a second execution plan;

calculating a cost for the second execution plan, wherein the cost for the second execution plan is represented as a second vector quantity; and

selecting one of the first and second execution plans based on the first and second vector quantities.

25. The method of claim 23, further comprising determining whether a selected execution plan meets predetermined acceptance criteria based on the vector quantity of the selected execution plan, wherein if the selected execution plan meets the predetermined acceptance criteria the selected execution plan is executed.

26. The method of claim 23, further comprising determining whether more confidence is desired for a selected plan.

27. A signal bearing medium containing a program which, when executed by a processor, performs a method of optimizing and processing a query in a database management system in order to retrieve data from computer storage, the method comprising:

receiving a query;

preparing a first execution plan for the query;

calculating a cost for the first execution plan, wherein the cost is represented as a first vector quantity comprising at least two dimensions; and

determining whether the first execution plan should be selected for execution based on the first vector quantity.

28. The signal bearing medium of claim 26, further comprising providing a signal

bearing medium which, when executed, performs the receiving, preparing and calculating.

29. The signal bearing medium of claim 26, wherein determining whether the first execution plan should be selected for execution comprises comparing two or more of the at least two dimensions.

30. The signal bearing medium of claim 26, wherein the at least two dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.

31. The signal bearing medium of claim 29, wherein the magnitude is a value having a highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude.

32. The signal bearing medium of claim 26, wherein calculating the cost comprises utilizing at least a second vector quantity comprising at least two dimensions.

33. The signal bearing medium of claim 31, wherein the at least two dimensions of the first vector quantity and the second vector quantity comprise at least one of a magnitude, a variance range, a confidence and a penalty.

34. The signal bearing medium of claim 26, wherein if the first execution plan is not selected for execution, further comprising:

preparing a second execution plan;

calculating a cost for the second execution plan; wherein the cost for the second execution plan is represented as a second vector quantity comprising at least two dimensions; and

selecting one of the execution plans based on the first and second vector quantities.

35. The signal bearing medium of claim 33, further comprising determining whether a selected execution plan meets acceptance criteria based on the vector quantity of the selected execution plan, wherein if the selected execution plan meets the acceptance criteria the selected execution plan is executed.

36. The signal bearing medium of claim 33, wherein one of the at least two dimensions comprises a confidence value and further comprising determining whether a higher confidence value is desired for a selected plan and, if so, pursuing a strategy to increase the confidence value.

37. The signal bearing medium of claim 33, wherein the at least two dimensions comprise at least one of a magnitude, a variance range, a confidence and a penalty.

38. The signal bearing medium of claim 36, wherein the magnitude is a value having the highest probability to be within the variance range, wherein the variance range is a range in which the confidence applies, wherein the confidence is a probability that a real value is within the variance range, and wherein the penalty is a maximum delta from the magnitude